CLEAR ROADS
research for winter highway maintenance

RESEARCH BRIEF

FEBRUARY 2025

MANAGING LIQUID DEICING STORAGE SYSTEMS

RESULTS SUMMARY

Guidance for maintaining liquid deicing storage and pump systems will help agencies create, maintain or expand a system.

PROJECT DETAILS

Project Title: Best Management Practices for Liquid Chloride Storage and Pumping Systems

Project Number: CR22-02

Project Cost: $75,000

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Need for Research

Transportation agencies are responsible for treating roads when winter weather events occur. One of their primary tools for ensuring a high level of service is the use of liquid deicer. Properly storing liquid deicer is essential to efficiently manage winter maintenance operations and reduce negative impacts from leakage and runoff. Some states have published guidance for deicer production and management, but the guidance has not specifically addressed storage equipment configurations, components, costs and other pertinent considerations when purchasing or expanding a system.

The primary goal of this project was to fill in information gaps related to the management of liquid deicing storage and pump systems. This information would be used to develop a user-friendly manual of best practices. Understanding and addressing the necessary detailed considerations when developing or altering their liquid deicing storage and pump systems will enable agencies to improve operations, maximize their expenditures and avoid potential pitfalls.

Objectives and Methodology

This project's objective was to examine and document the current use of liquid deicing storage and pump systems in state departments of transportation (DOTs) and public works agencies to share system designs and develop a manual of best practices for agencies to consult when creating a new system or expanding their current system. Researchers conducted surveys and in-depth interviews with transportation agencies and vendors to identify system designs, best practices and lessons learned from those operating and maintaining these systems.

A preliminary literature search produced a limited number of pertinent sources. A survey of state DOTs and public works agencies collected information regarding liquid deicing storage and pump systems use across the country. Follow-up interviews with nine DOTs and one municipality obtained more detailed information. Also interviewed for this project were six equipment vendors and manufacturers.

Researchers compiled the results of these efforts into a best practices manual that focused on system considerations, operations and maintenance for a range

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Effectively constructing and managing liquid chloride storage tanks is essential for transportation agencies that deice roads in wintry weather.

of liquid deicer storage and pumping systems, from simple to advanced, to meet the unique equipment and funding needs of all agencies.

Results

The survey received 49 responses (from 27 states), with 34 of the responses detailing their experience with liquid deicing storage and pump systems. These agencies identified 19 manufacturers and five equipment suppliers. Respondents emphasized preventive maintenance, such as conducting consistent inspections; recirculating the system in the off-season; performing regular system cleaning; and lubricating all fittings and valves, and ensuring they fit properly.

Analyses of the findings from the literature review, survey results and interviews produced a series of best practices and recommendations, including:

- Consider future operational needs when planning and building a storage and pumping system.
- Maintain flexibility for variable life cycles of the equipment.
- Start small and build out if needed.
- Proactively perform regular inspections and maintenance to prevent more serious disrepair.
- Develop and use a checklist that clearly identifies inspection and maintenance steps. Ensure employees consistently use the checklist.
- Maintain an inventory of supplies for emergencies (such as a leak) to address problems immediately.
- Make employee safety a top priority.
- Incorporate design considerations that address extreme weather conditions.

In addition to best practices, the manual includes images and descriptions of typical equipment configurations currently in use with a list of primary components, estimated system costs, and benefits and challenges associated with each configuration.

Other materials developed in this project include a maintenance inspection checklist (for systems with or without brine units), a one-page safety considerations flyer and a one-page list of parts and supplies to keep on hand to quickly address emergencies.

Implementation and Benefits

This project provides guidance to assist transportation agencies in planning, building and managing liquid deicer storage and pumping systems. Agencies can apply the best practices summarized in the guidance manual to effectively build and safely manage operations given their capacity needs and available funding.

"This project provides transportation agencies of all sizes with valuable guidance and best practices for building or expanding their liquid deicer storage facilities to best meet their winter maintenance needs."

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